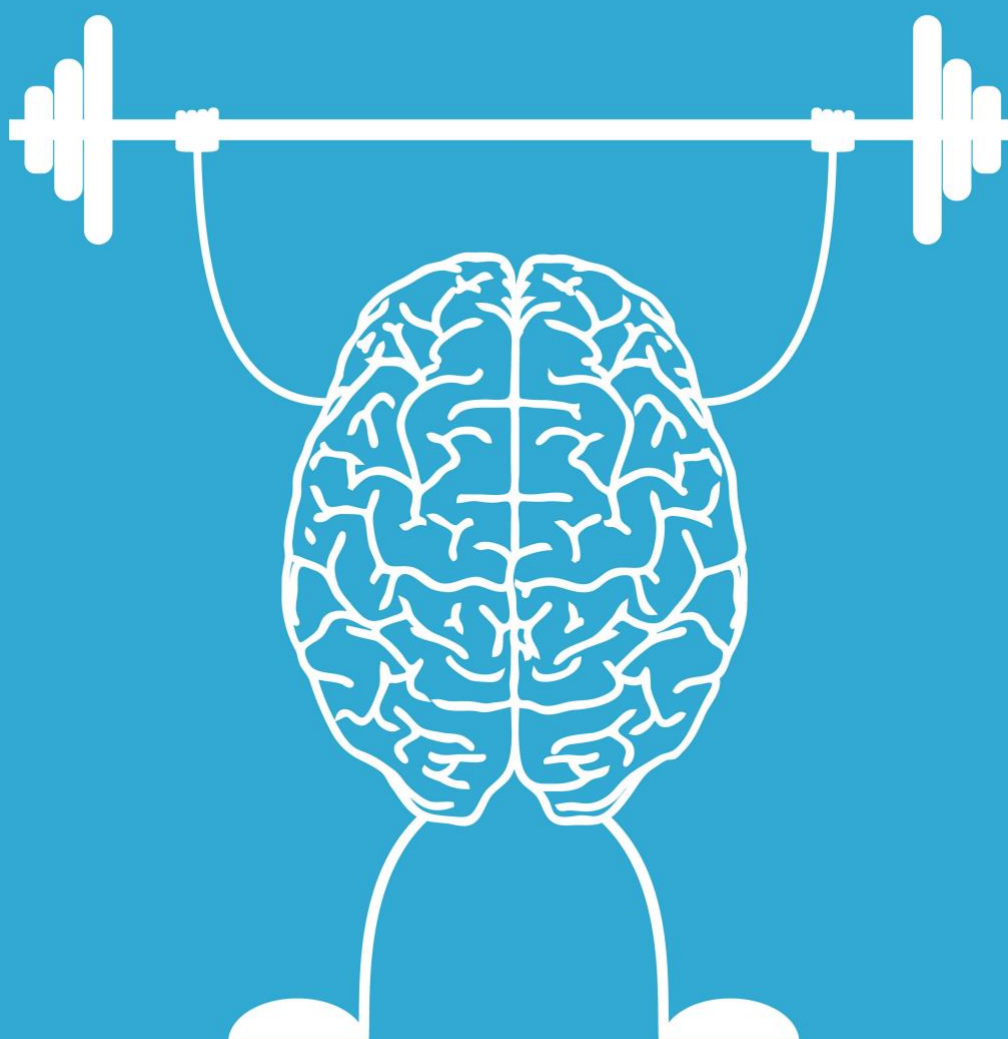


Cognitive Fitness in the mental health sector

Nationwide implementation and quality assurance



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Conten

Introduction	5
1 Cognitive Fitness	7
2 Research design	9
2.1 Research questions	9
2.2 Methods	9
2.3 Analyses	12
2.4 Medical-Etical Review	12
3 Implementation and quality review	13
3.1 Setting and recruitment process	13
3.2 Participation in research and training	14
3.3 Quality assessment fidelity instrument Cognitive Fitness	16
3.4 Participants' experiences of the training	17
3.5 Implementation process at the institutions	19
4 Results	21
4.1 Research group characteristics	21
4.2 Mental health	22
4.3 Overall health and quality of life	23
4.4 Self-confidence and empowerment	26
4.5 Physical exercise	27
4.6 Physical parameters	29
4.7 Neurocognitive research	30
5 Summary, discussion and recommendations	37
5.1 Summary	37
5.2 Discussion	39
5.3 Conclusion	41
6 Literature	43
Annex	47

Introduction

People with severe mental disorders face problems in several areas of life. Besides psychiatric problems, many have lifestyle-related problems such as obesity, hypertension, diabetes and poor energy and inactivity (Appelo 2005; Slooff 2008; Working Group on Guideline Development on General Somatic Screening & Lifestyle, 2014). The target group also relatively often has problems in cognitive functioning (planning, concentrating, learning, memory; Bora & Pantelis, 2015). These problems in turn adversely affect self-esteem and social participation and the ultimate life expectancy of this target group; the employment rate of the target group is not much higher than 10-20% (Place et al, 2014) and life expectancy is thirteen to thirty years lower than that of the general population (De Hert et al, 2011). Care services focus mainly on psychiatric problems and practical support and relatively little on cognitive and somatic problems (Van Hasselt, 2013). The fact that care services pay comparatively little attention to these problems is also due to a lack of interventions. The multidisciplinary guideline on schizophrenia (2012) provides few starting points, especially in the field of cognitive skills.

In recent years, there has been increasing evidence that exercise has a positive impact on cognitive skills. The relationship between exercise and cognition has been studied mainly in the elderly. There is evidence that sports and exercise have a beneficial effect on cognitive functioning in the elderly (Cai & Abrahamson, 2015). However, a beneficial effect of exercise on cognitive functioning has now also been found in people with severe mental disorders, such as psychotic disorder or major depression (Pajonk 2010); further research into this relationship is recommended (Van Campfort 2010). To enhance the effect on cognitive abilities, it is recommended to combine exercise with cognitive stimulation (Sitskoorn 2004). So far, there have been no studies within psychiatry in which an exercise intervention was combined with cognitive training. Yet there are indications in other target groups that precisely this combination is effective. In three studies conducted in the elderly, the effects of combined training were more favourable than when only cognitive or physical training was given (Klusman et al, 2010; Fabre et al, 2002; Oswald et al, 2006).

It is not yet known exactly how these effects can be explained. Exercise may help to better regulate blood sugar levels (glucose metabolism), which in turn - this has also been studied in people with psychoses - has a beneficial impact on cognitive functioning (Scheewe et al, 2012; Heggelund et al, 2012). Another explanation is that exercise promotes the production and protection of nerve cells, including via the so-called brain-derived neurotrophic factor (BDNF; Laske 2010), which seems to be present at a reduced level precisely in the target group (Toll & Mané, 2015).

The neurocognitive training method Cognitive Fitness is founded on the aforementioned insights that exercise and cognitive skills seem to interact favourably. This group training was developed by Body Brain Dynamics (www.cognitiefitness.nl) to

promotion of physical and mental fitness based on physical exercise, intellectual challenge and relaxation exercises.

A pilot study identified initial experiences and benefits (Van Wezep et al., 2012). In that study, the trainings were delivered by the developers of the training. In the follow-up project that is the subject of this report, we aimed at wider implementation of cognitive fitness, through training of new trainers, while maintaining the quality and benefits of the original training.

This report describes the experiences and benefits of this wider implementation of Cognitive Fitness training at several mental health institutions, spread across the country. The trainings were now not delivered by the developers, but by trained trainers from the institutions. In addition, some adjustments were made based on the pilot: the training was expanded from 12 to 15 weekly sessions and more attention was paid to healthy eating. The study was extended to include a follow-up, four months after the end of the training, to determine whether any effects are lasting.

The report is structured as follows. In the first chapter, we describe the training methodology. Chapter 2 describes the research design. In chapter 3, we examine how the method was implemented in practice and what the implementation experiences were. Chapter 4 discusses the benefits of the course for the participants. Finally, in chapter 5 we summarise the main insights of the study and discuss the results.

1 Cognitive Fitness

Cognitive Fitness (CF) training consists of 15 weekly classes. During these one-and-a-half-hour sessions, fitness exercises, breathing techniques and meditation forms are combined with cognitive exercises. In addition, participants are given homework assignments. The training sessions are characterised by a gradual build-up, both in load and intensity. Although it is a group training programme, the individual capabilities and limitations of participants are taken into account in terms of tempo, level of difficulty and intensity of supervision. The training sessions have a casual, non-competitive atmosphere.

The course is made up of 4 blocks. The first 3 blocks consist of 4 lessons focusing on specific motor and cognitive skills (memory and concentration, logic and spatial awareness, and coordination and responsiveness, respectively). In lesson 4 of these blocks, the exercises from the first 3 lessons are repeated. The repetition of exercise material is deliberately built into the training programme to reinforce and deepen what has been learnt. During CF training, participants are challenged to learn new things. Mastering these requires practice and repetition is an important aspect. Practice and repetition strengthen the connections in the brain. Each training session consists of 4 standard lesson components (see table 1.1). The warm-up consists of exercises that promote blood flow to the muscles and increase heart rate and breathing. The core part consists of a combination of muscle-strengthening exercises and cardio exercises interspersed with exercises aimed at stimulating cognitive skills such as memory, responsiveness, coordination and logic. In 'boot camp', for example, participants have to switch physical activities every other minute. Examples of these activities include: dribbling with a sprint in the last 10 seconds, using the dynaband to bring arms apart and lifting weights. Examples of exercises that combine cognition and movement are:

- Memory: imitating your predecessor's exercise or remembering words you hear on a sound clip while walking around the room;
- Responsiveness: move your feet as quickly as possible when touched;
- Coordination: throwing up a ball and clapping your hands, juggling;
- Logic: putting pictures from a comic strip in the right order, doing arithmetic.

Table 1.1 Structure of training session Cognitive Fitness

Section	Points of interest	Duration
1. Warming up	<ul style="list-style-type: none">• Gradual build-up of intensity• Matching to load capacity	10 minutes
2. Core part (<i>effort and challenge</i>)	<ul style="list-style-type: none">• Exercises aimed at fitness and strength• Exercises focused on cognitive and sensory stimulation	50 minutes
3. Cooling down (<i>relaxation</i>)	<ul style="list-style-type: none">• Stretching exercises• Breathing exercises• Relaxation exercises	15 minutes
4. Debrief	<ul style="list-style-type: none">• Debriefing lesson• Explanation of upcoming homework assignment• Space for feedback made home-work assignment	15 minutes

The training will focus on the effect of nutrition on the body and mind. The topics covered are:

- Fats: distinction saturated and unsaturated fats, omega-3 fats, EPA and DHA
- Carbohydrates: glucose
- Anti-oxidants
- Vitamins and minerals
- Nutritional supplements

The participant receives information on nutrition through the workbook. During the post-lesson discussion, the trainer pays attention to the topic by discussing the assignments focused on nutrition.

2 Research design

2.1 Research questions

The study has two objectives. The first objective is to identify the benefits of the training for patients. Primarily this involves improvements in cognitive skills, secondly also improvements in physical and mental health, exercise activities, quality of life and self-management. In addition, we have an implementation objective. The original training was delivered by the developers of cognitive fitness. The new trainings are delivered by an employee of the institution after attending a trainer training course. We want to determine whether the new trainers deliver the trainings as intended and how the implementation of the training at participating institutions is going.

2.2 Methods

2.2.1 Study design

Impact evaluation

The effect evaluation has a pre-post test design with no control group. There are three measurements; a baseline measurement prior to training (T0), a measurement immediately after training (four months later; T4), and a follow-up measurement (eight months later; T8). This last measurement aims to see whether the effect is lasting.

Process evaluation

To identify the quality objectives, an integrity instrument, also called a fidelity instrument, was developed in collaboration with the developers of the training (see, for example, Kroon & Bähler, 2015). A fidelity instrument is used to measure how model-fidelity of a particular methodology is implemented within an organisation. In addition, trainers were interviewed about the course of implementation.

2.2.2 Inclusion and exclusion criteria

The target group in this project are people with severe psychiatric disorders. They may be both people who have only been struggling with these problems for a relatively short time and people who have already been in care for a long time. In each case, it concerns a group with both psychological and social and often physical problems. Diagnoses such as psychosis, bipolar disorder and personality disorders often underlie the problems. There are no hard exclusion criteria with regard to diagnosis and/or physical and cognitive fitness. Cognitive Fitness trainers are expected to adapt the exercises to the individual level of the participant. However, the participant must be able to perform the exercises. People who are dependent on a wheelchair or

have such a disability that walking during the 1.5-hour session is not possible are not advised to participate. To establish this, a prerequisite is that those interested have attended an information session where they were able to experience for themselves what the training requires of them. Other inclusion criteria are:

- Age minimum 18 years;
- Stability in medication use; i.e. at least 4 weeks prior to study inclusion;
- Sufficient command of the Dutch language to complete questionnaires.

In addition, we determine blood pressure during the pre-measurement. With an average blood pressure (over three measurements) higher than 140/90, the participant (via the case manager) is asked to contact the treating physician. The treating physician then decides whether the client can participate in the study.

2.2.3 Measuring instruments

For the effect evaluation, we use the following measuring instruments. These measurement instruments are taken at T0, T4 and T8.

Neurocognitive testing:

- Trail Making Test, A and B (Eling, et al. 2003); this is a test to measure mental flexibility. Participants have to connect numbers and letters in the correct order as quickly as possible. In part A, only digits have to be connected; in part B, digits and letters have to be connected alternately in ascending order (1, A, 2, B, etc.);
- 15 Word test (Saan & Deelman, 1986): a test for verbal learning and short-term memory. Participants were told the same series of 15 words five times and had to repeat them after a period of at least 20 minutes. At the between- and after-measurement, different words were offered to avoid participants recognising words from the previous take and therefore scoring better;
- Continuous Performance Test - Identical Pairs (Cornblatt, 1989): this test measures attention and impulsivity. Participants are shown numbers at high speed and have to detect a particular combination;
- Wisconsin Card Sorting Test (Banno, 2012; Berg, 1948): a test used to detect disorders in cognitive flexibility. Participants have to sort cards, constantly changing the strategy to reach the correct solution without notice. A good score is achieved if one always manages to adjust the solution strategy in time.

Physical parameters:

- BMI ($\text{weight}/\text{length}^2$). For this, we use a scale and a length gauge;
- Blood pressure measurement with a digital blood pressure monitor (OMRON);
- Exercise test; 6-minute walk test (ATS, 2002). The 6-minute walk test is a submaximal exercise test. Research shows that the test is appropriate for this study group and correlates with functional impairments associated with schizophrenia (Vancampfort et al., 2012). The test is a good reflection of the participant's condition (Belza, 2001).

Components questionnaires:

- General data;
- Short Complaint List (Lange & Appelo 2007). This questionnaire provides an indication of psychological suffering. For this study, only the following complaints were asked out: concentration problems, memory problems, irritability and sleep problems;
- Mental and Physical Health; RAND-36 (Van der Zee & Sanderman 1993). This questionnaire measures general health status. For this study, the scales mental health, vitality, pain, general health perception and health change were included in the questionnaire;
- Quality of life questionnaire from the South Limburg Care Monitor (Delespaul et al., 2008);
- Physical Activity; The Short Questionnaire to ASsess Health (SQUASH; Wendel-Vos et al., 2003) is administered to determine the level of physical activity. Both frequency and duration of physical activity are covered;
- Well-being is measured using the WHO-5 Well-being Index (WHO-5; (Bech, 2004). The WHO-5 questionnaire consists of five positively worded items according to mental health;
- Confidence in own ability was measured with Mental Health Confidence Scale (MHCS; Carpinello et al 2000);
- Empowerment as a broader concept was measured with the Netherlands Empowerment List (NEL; Boevink et al. 2009). The NEL has six subdomains. For this study, we used only the subscales belonging, self-management and own power.

Process evaluation:

To understand the implementation of cognitive fitness training, we collected information in the following ways:

1. Interviews with Cognitive Fitness trainers

Telephone interviews with the trainers took place after the three measurements. Topics discussed in this conversation included recruitment and attendance, experiences with the training, facilitation by the organisation, funding, success factors and barriers to implementation and plans for the future.

2. Participants' experiences of the training

The intermediate measurement questionnaire included a number of open questions such as experience with the training and the trainer, points for improvement, grade for the training and whether they would like to continue with the training.

3. Fidelity instrument

To assess the quality of implementation, an integrity instrument, also known as a fidelity instrument, was developed in collaboration with the developers of the training. This instrument was used to measure how model-fidelity of a given methodology is implemented within an organisation. The instrument includes elements that the implementation of Cognitive Fitness training should meet. The fidelity was developed on the basis of the Cognitive Fitness trainer manual and presented to Cognitive Fitness trainers. Through scores on the different components, it maps to what extent the trainer performs the training according to the Cognitive Fitness protocol. There are a total of seven different components:

competences of the trainer, teaching skills, methodical skills, the structure and delivery of the training, preconditions and attendance (see annex). Each item is composed of one or more items, in total there are 29 items. Depending on the extent to which the item is met, a score 1, 2 or 3 is assigned. Two researchers scored the instrument through an observation of a training session - usually halfway through the training programme - supplemented by a pre- and post-training discussion with the trainers. The reported scores are the consensus scores of the two observers.

2.3 Analyses

For the quantitative analyses, apart from descriptive statistics, the paired t-test, chi-square test and McNemar test were used to show any changes. The analyses were done using SPSS-22. For averages, the standard deviation (SD) is also presented. We compare scores at the between- (T4) and after-measurement (T8) with the pre-measurement (T0). In the analyses, the first step involves all participants who participated in the study. Next, we will include in the analyses those participants who attended more than half of the training, or eight or more training sessions. In the table, this group is described as the "participation group" and in the text also as "loyal participants".

In the statistical analyses, we use a significance level of 0.05. Since the study group is relatively small and it is therefore more difficult to show significant effects, we also present the trend ($\alpha < 0.1$).

The tables in the results section (H4) have the following structure:

Entire group			Participation group		
T0	T4	T8	T0	T4	T8
N=74	N=59	N=51	N=38	N=37	N=36

These are the numbers belonging to the measurement times. If the N differs by more than 10%, we report the differing N in the table. The value of T0 among the whole group and the group that completed the intervention is based on the number that had the pre-measurement and the number that had and/or intermediate and/or final measurement.

2.4 Medical ethics review

This research project has been approved by the medical ethics review committee (METC) of the VU medical centre in Amsterdam. The file number is NL47122_029.14.

3 Implementation and quality review

In this chapter, we discuss the implementation of Cognitive Fitness training. We first discuss the recruitment process for each institution and its results. We then clarify what the dropout rate was in terms of survey and training participation. The results of the model fidelity test are discussed in section 3.3. We end this chapter with experiences and areas for improvement.

3.1 Setting and recruitment process

The study took place at one institution from the Rotterdam region (Parnassia-Bavo Groep), two institutions from the province of Utrecht (Kwintes and Lister), the North Brabant mental health institution GGz Breburg and two organisations from Zeeland (Admiraal de Ruyter hospital and Emergis).

Recruitment

The recruitment process involved the following steps:

- Information about the training was disseminated through flyers, information letters and word of mouth;
- The trainers gave a mini-workshop on cognitive fitness to the caregivers at the targeted recruitment site; followed by the researchers to provide information about the study;
- Clients could express their interest themselves and/or were actively approached by personal tutors and trainers;
- Interested clients participated in a mini-workshop on cognitive fitness, followed by information about the study. Sometimes, an additional workshop was also held for family members of the clients.

If clients wanted to participate after workshop and education, they completed an informed consent form, indicating they were well-informed about the study, agreed to participate and understood that they could also withdraw from the study. This form was also signed by the researcher.

Participating locations

Parnassia Bavo Group - Non-congenital Brain Injury (NAH) department Rotterdam

The study in the Rotterdam region took place at the non-congenital brain injury (NAH) ward of the Parnassia-Bavo Group in Rotterdam. This ward admits people who have suffered brain damage as a result of a stroke, accident or meningitis. They all have additional psychiatric problems, usually as a result of the injury, but sometimes independently of it. In addition to inpatient treatment, part-time help is also offered to outpatient clients.

A total of 10 participants (7 part-time and 3 clinically admitted) participated in the training and the study.

Kwintes - Gouda

Kwintes supports people with mental or social vulnerability in living, working, learning and recreation. Kwintes provides tailor-made care to a broad client group in the central Netherlands, who live partly independently and partly in sheltered accommodation. The study took place in Gouda. Nine participants started the training and the study.

Lister - Houten

Lister (Utrecht region) provides guidance and housing to people with psychiatric and/or addiction problems. The location in Houten participated in the study. Recruitment was organised more broadly here than at the other participating institutions. Besides the usual route, it was also advertised in a local newspaper and through a welfare organisation. This was a general appeal for people in the neighbourhood. Initially, 15 people applied and 12 eventually started. Of these 12, 7 participated in the training and the survey; these were Lister's clients.

GGz Breburg - Oosterhout

GGz Breburg is an integrated mental health institution. The clients who participated in the Cognitive Fitness training were attached to one of the two FACT teams in Oosterhout. FACT (Flexible Assertive Community Treatment) stands for intensive, integrated care and support, usually in the home situation, from an outpatient team. A total of 20 clients participated in the training and research.

Admiral de Ruyter hospital - Flushing

Admiral de Ruyter Hospital, psychiatry department, focuses on patients with psychiatric disorders, such as mood and anxiety disorders, psychotic disorders, personality disorders and addiction problems. The 16 participants in the Cognitive Fitness training received outpatient supervision from the psychiatry department.

Emergis - Goes

Emergis is an integrated mental health institution in Zeeland. The study took place among 12 clients of sheltered housing in Goes.

3.2 Participation in research and training

Participation and dropout research

A total of 74 clients participated in the survey (see table). Of the 74 participants, 15 did not participate in the intermediate measurement, a dropout rate of 20%. At the final measurement, the dropout rate was 31%. When participants missed both the intermediate and final measurement, they qualified as dropouts and were not included in the research analyses. These are 10 participants (14%). There were several reasons for dropping out or missing a measurement. A number of participants indicated that (worsening) psychological symptoms prevented participation. One participant did come to the measurement, but suffered too much from depressive symptoms while completing it and had to stop. Being too busy was also given as a reason several times. A number of participants had lost interest in the survey. Two people also managed to

not to come to the measurement, one because of a broken shoulder and the other because travel expenses were not covered by the insurance company. Illness at the time of the measurement was also a reason. Five participants we were unable to get hold of or they gave no reason for dropping out of the study.

Table 3.1 Survey participation, loyal participants and drop-out by institution

	Survey participation T0	Participation research T4	Participation research T8	>=8 sessions	Study drop-out
Setting					
GGz Breburg	20	18	15	12	2
Kwintes-Gouda	9	7	5	5	2
Emergis	12	9	7	1	1
Lister-Wood	7	5	3	5	2
Parnassia-NAH	10	9	9	7	0
ADRZ	16	11	12	10	3
Total	74	59 (80%)	51 (69%)	40 (54%)	10 (14%)

Participation and dropout training

Of the 74 participants, we consider 40 participants (54%) to be the participation group; they attended at least eight sessions; 34 participants thus stopped the training in the interim, 3 of whom did not attend any training.

The participants who stopped training most often indicated that the reason was physical in nature, such as an ankle injury, meniscus surgery, broken shoulder, etc. They also often indicated that the cause was psychological, such as suffering from hearing voices that made concentration difficult, or feeling cramped by too many people in too small a space. For two participants, their expectations of the training did not come true, three participants were too busy and one did not like the timing. On reflection, one participant preferred to enjoy the ordinary things in life, such as a walk on the beach, rather than attend a structured training course.

Turnout at training sessions

The training consisted of 15 sessions. On average, participants attended 8 training sessions. This average varied by institution. The lowest attendance was at Emergis with an average of four attended sessions. At Parnassia, attendance was highest with an average of 11 training sessions attended. At Kwintes and Lister the average was eight training sessions and at GGz Breburg and ADRZ the average was nine meetings. We will return to possible reasons for the varying attendance in section 3.5.

3.3 Quality assessment-fidelity instrument Cognitive Fitness

A meeting was attended at each of the training sites to score the fidelity instrument. Table 3.2 below shows the scores on the different items and subscales of the instrument.

Table 3.2 Fidelity scores (score from 1=low, to 3=high).

Subscale	Theme	Average (min/max)
Competences	Professional	2,6 (2-3)
	Organisational	2,8 (2-3)
		Average total 2.7
Didactic	Attitude	2,7 (1-3)
	Presentation	3
	Wording	3
	Clarity	3
	Enthusiasm	3
	Motivational	2,2 (2-3)
		Average total 2.8
Methodology	Offer	2,8 (2-3)
	Does it	2,8 (2-3)
	Exercises customise	3
	Feedback	2,3 (2-3)
		Average total 2.8
Training	Small-talk	2,7 (2-3)
	Rational	1,5 (1-3)
	Warm-up	2,7 (2-3)
	Core	2,5 (2-3)
	Cooling-down	2,5 (2-3)
	Break	2,8 (2-3)
	Evaluation	2,2 (1-3)
	Homework	2,5 (2-3)
	Implementation	2,7 (2-3)
		Average total 2.4
Facility	Space	2,5 (2-3)
	Accessibility	2,8 (2-3)
	Timing	2,3 (2-3)
	Ratio	2,3 (2-3)
	Workbook	3
		Average total 2.7
Cooperation trainers		3
Rev	Turnout	1,8 (1-3)
	Motivation	2,8 (2-3)
		Average total 2.3
Overall score		2,6 (2,5 -2,8)

Overall, high scores are achieved. On average across all items, the lowest site score is a 2.5 and the highest a 2.8. The differences between the organisations are thus small. Thus, at each of the sites, the training model was implemented with high to very high fidelity. The highest scores (2.8) are on the didactics and methodology components. The trainers give clear instructions, are enthusiastic and always manage to adapt the exercises to the level of the group and the individuals within it. Individual exercises follow well the desired structure of brief explanation, demonstration and action, and trainers generally dwell on the homework from the previous week.

Only two items score low: rationale and attendance. The trainers usually do not explain the purpose of a particular exercise and the attendance rate usually remains below 80%, in a few locations below 60%. However, trainers do actively try to keep the dropout rate as low as possible by whatsapping, texting and making follow-up calls. Furthermore, we see a somewhat lower score (-2.2) on the item motivation. For this item, the trainer regularly compliments the participants, makes sure the participant experiences success, names the benefits of the exercise and uses encouragement techniques. In particular, the item on naming the benefits of doing the exercise is hardly done. It also scores relatively low on the item evaluation (2.2). The debriefing is an informal moment when the trainer looks back on the training together with the participants. People often discuss what they thought of the training, but we sometimes missed an active form of feedback and deepening.

3.4 Participants' experiences of training

The questionnaire of the intermediate measurement included a number of open-ended questions about experiences with the Cognitive Fitness training. Below, the experiences are described and illustrated with statements from the participants.

Training content

A total of 52 people gave the training a mark after the training (at the intermediate measurement). The average mark was an 8.3 (SD=1.1), i.e. a high mark. The lowest mark was a 5 (respondent wanted more challenge and different levels of difficulty) and the highest mark was a 10. If we include only the participants who attended 8 or more training sessions, the mean is an 8.6 where the lowest was a 7 and the highest a 10.

We asked participants what needs to change to give the training a point higher. A few indicated that the timing could be changed. They also wanted a follow-up training. One participant indicated that either the group could be smaller or the space larger. Some would like to see shorter assignments, others more physical exercise. More space to share experiences is also a point for improvement for one participant. But most participants indicated that nothing needs to be changed.

Most special experience

We asked participants what was the most special experience during the training. 34 participants answered. What we often see reflected in the answers is awareness in several areas. Someone indicates that he or she is more aware that he or she can still move well. Someone also indicates that he or she has gained more understanding for people with various mental illnesses. On a psychological level, participants also indicate that they have had special experiences. Reactions include learning to trust other people, more discipline to do exercises at home, being allowed to be who you are, previously often falling outside the group, proud feeling that exercises are going better and better. We also see that experiences in the field of concentration are mentioned a lot. For instance, someone says he has more concentration when reading and can focus better on a subject. Physically, people experience better fitness, more energy after training and better sleep. The good group atmosphere was also a special experience for many. Someone indicates that it was always very sociable, another indicates that exercising together with fun was a special experience, also that everyone was so understanding in the group and that it is so special that with a group that does not know each other you become closer and closer. Finally, the feeling of being able to relax a little easier in stressful situations was mentioned.

Homework assignments

Of the 52 people who completed the questionnaire, 50% said they did not do the homework assignments. The reasons given were lack of time or energy or because other things were more important (no priority).

The trainers

A total of 28 participants completed the question on feedback to trainers. These were positive responses, one and all praise. Participants found the trainers professional, they gave sufficient attention per person, gave good explanations, were respectful, well prepared, sociable and cheerful. The often large differences between participants were handled well. Two participants gave points for improvement. One participant said they could be more 'strict' and give more information. Another participant indicated that more attention could be paid to homework.

Group atmosphere

Participants are very satisfied with the group atmosphere (N=26). They talk about a group feeling, that it is cosy, fun and fantastic. One person remarked "the atmosphere was particularly good, something was slowly coming up among the regular comers and at the end it was even a hen house". Someone also commented that everyone was very sociable and compassionate. Only one person indicated that he found it a bit variable, the atmosphere was good, but the group sometimes a bit too passive.

More than half of the participants (N=27) said they gained social contacts from the training. Contact details were exchanged, friendships sometimes formed and some still go for coffee together.

3.5 Implementation process at institutions

We interviewed the trainers about the implementation process; in this section, we discuss their insights and experiences.

Recruitment and attendance

Overall, the recruitment of participants for the training went very well. One success factor was that the trainers often gave a workshop on Cognitive Fitness to the personal supervisors or case managers. There was a positive response to this; it really came to life among the supervisors this way, which in turn had a positive influence on recruitment. One trainer indicated that recruitment went very well for the first three trainings, but that recruitment became more difficult after that. This was partly due to the reorganisation at the institution, which caused a lot of unrest among the supervisors. At another organisation, the response was very positive but it was difficult to free up a place for the training due to the participants' busy rehabilitation programme. One trainer also indicated that although recruitment had gone well, he had had to free up a lot of time to publicise the training.

As described earlier, participants attended only eight out of 15 training sessions on average. The trainers see this as the biggest obstacle in implementing the training. We asked the trainers what the reasons were. Most indicated that complaints arising from the clinical picture were often reasons for non-attendance. According to the trainers, the dropout rate is common in this target group. They also recognise this in other group interventions.

According to the trainers, what helps to maintain attendance is to keep actively approaching participants when they do not come. It is also important to keep inviting them, complimenting them when they come and lowering thresholds (being at the training for half an hour is also good). At one organisation, participants counted on each other and reminded each other.

Looking over the attendance rates and reasons given, relatively low attendance seems to occur mainly when clients participate on request (rather than on their own initiative), are more dependent on care and have to make more effort to get to the training location. The high attendance at Parnassia may be explained by the somewhat different target group (people with non-congenital brain injury), and because the training was a regular part of the clinical/part-time programme.

Added value for participants

Descriptions of the perceived added value by the participants recur in the interviews with the trainers. The trainers emphasise the added value of training in a group. The group feeling is huge and very much stimulated by the training. For one client who had difficulties functioning in a group, the training has made him much more comfortable. Other experiences described by trainers include more energy among clients, a more positive self-image, more self-esteem, it gives clients a structure, more attention during conversations, better health, fewer physical complaints and more active and positive behaviour.

Facilitation by the organisation

In general, trainers were well facilitated by the organisation. They were freed from other work to be able to deliver the training. At one institution, a gym was rented nearby so that participants would not immediately associate it with the mental health institution again. One trainer said she was given all the freedom she needed to design the training for the clients. What she encountered was the flexibility of the existing treatment programme for the clients. There was hardly any room to deliver the training. At another organisation, fellow colleagues indicated that missing two colleagues in the morning of the training is quite a lot, especially if there is a crisis.

Funding and follow-up plans

Trainers and institutions are positive about the training. The intended future embedding varies from institution to institution. Sometimes the line initiated is continued on the same scale, sometimes scaling up is considered and sometimes continuation depends on funding opportunities.

Training fell under different funding regimes (AWBZ, ZVW, WMO) at the institutions. In the transition from AWBZ to WMO, 2015 was a transitional year and whatever was funded in 2014 was maintained. For next year (2016), new agreements must be made with municipalities on this. The three organisations concerned are positive about Cognitive Fitness and hope it will be funded through the WMO in 2016.

At the institution for clients with non-congenital brain injury, Cognitive Therapy is offered as a vocational therapy covered by the DBC. It continues to be offered within the treatment programme.

One mental health institution is considering including Cognitive Fitness in one of its care pathways so that it will become a regular part of the treatment and will be funded from a DBC. At another institution, embedding it within the recovery academy is on the agenda. Recovery academies are currently on the rise within the mental healthcare sector; they offer a learning environment in which participants can work on their own recovery process in various ways, with the support of experts by experience. The intention is therefore to give experts by experience a greater role in training.

One of the institutions in this implementation project also offered the training to a wider community audience. A trainer from another organisation now also provides the training in this way. After all, cognitive fitness is not originally tied to the specific target group of people with severe psychiatric disorders. Consideration is being given to making cognitive fitness a general WMO provision, so that no indication needs to be issued to participate in the training.

4 Results

4.1 Characteristics research group

Sociodemographic characteristics

The group of participants (n=74) consists of slightly more women (53%) than men (47%). The youngest participant is 23 years old and the oldest participant is 71 years old. The average age is 46.7 years (sd=11.8). Less than half (41%) have primary, lower vocational or mavo education as their highest completed education and 31% have completed HAVO or higher education. Most clients are unmarried (41%) or divorced (30%). Of the participants, the largest group lives independently and alone (45%), 27% live in an institution or flat of an institution and 24% live with a partner and/or children.

Over a third do voluntary work (35%), 16% have paid work, 4% go to school or study and 26% follow a course or training. More than half (55%) of the participants have been declared partially or fully disabled.

Psychiatric background

Participants were asked what psychological complaints they suffer from. The vast majority (81%) of participants have suffered from mental health complaints for 1 year or more. Just under half of the participants (43%) reported having depressive symptoms, 40% have anxiety symptoms, 22% struggle with a personality disorder and 35% suffer from psychosis and/or schizophrenia. A vast majority (81%) use medication prescribed by a doctor to reduce or control their mental health symptoms.

Participants mainly experience limitations in the areas of work (78%) and social contacts (73%). Just over half (51%) of the participants also experience limitations in terms of living. Of the participants, 73% indicated that they suffer quite to much from concentration problems, 61% from memory problems, 37% from sleeping problems and 51% suffer quite to much from irritability.

Physical conditions

The most frequently mentioned physical condition requiring treatment is back disorders (persistent symptoms lasting longer than 3 months), 18% of participants suffer from this. This is followed by joint wear (osteoarthritis) being the most frequently mentioned (11%). Consequences of brain haemorrhage or cerebral infarction are mentioned by 10%, the same percentage for thyroid disorder and migraine. COPD and diabetes (diabetes) are indicated by 8% of participants.

General health

Almost half of the participants consider their health moderate to poor (45%), while the rest rate their health as good to excellent. Almost half (47%) of participants say their health is better compared to a year ago. More than a third (38%) say their health has remained about the same and 15% indicate

indicate that their health is worse than a year ago.

The average weight of the participants is 82 kilograms and the average BMI is 27.4. With a BMI above 25, one speaks of being overweight. More than half of the participants (62%) have a BMI higher than 25 and thus struggle with obesity. Almost one-third (30%) of the participants have a BMI higher than 30, meaning they are suffering from severe overweight, also known as obesity.

Difference characteristics research group between participating institutions

The participating institutions all provide care to people with (long-term) mental disorders, but there are differences in client characteristics per institution. Here we describe the most striking differences. We find the highest average age at Kwintes (55.4 years) and the lowest at Lister (37.0 years). On average, 27% of the participants are admitted to an institution or live in a flat of a care institution. The percentage is significantly higher at Emergis (67%), Lister (43%) and Parnassia (40%). Participants with paid work are mainly found at Kwintes (22%) and ADRZ (38%).

Looking at the differences in psychiatric background, we see the most striking differences at Parnassia-NAH. On almost all psychiatric diagnoses, we see a lower percentage compared to the other institutions. This has to do with the background of the clients; the non-congenital brain injury is the main focus rather than the additional psychiatric symptoms. Furthermore, we see that having psychoses/schizophrenia occurs mostly among the clients of GGz Breburg and Emergis. Autism is most common among Lister clients.

4.2 Psychological health

The table below shows the areas in which participants judge they experience limitations from their mental health symptoms in the areas of living, working and social contacts. The results show that fewer participants at the intermediate measurement compared to the pre-measurement experience limitations in the area of living. We also see this in the participation group, the loyal visitors. However, these changes are not significant; a trend can be seen. At the final measurement, the results are similar.

Table 4.1 Results in impairments due to psychological complaints

Limitations due to mental health issues:	Entire group			Participation group		
	T0	T4	T8	T0	T4	T8
Living	53%	40%**	40%**	55%	35%**	35%
Work	80%	82%	72%	76%	80%	65%
Social contacts	73%	67%	70%	74%	68%	63%

Table 4.2 shows the extent to which participants suffered from concentration, memory, sleep problems and irritability. This was measured using the Short Complaints List (Appelo et al., 2007). The scale runs from 1 to 5, where 1 stands for 'not bothered' and 5 for 'very bothered'. On the intermediate measurement, participants experienced fewer concentration problems, on

the final measurement, this effect persists and with it comes reduced irritability. On the final measurement, loyal participants also experience fewer sleep problems.

Table 4.2 Results of the KKL list

Complaints	Entire group			Participation group		
	T0	T4	T8	T0	T4	T8
Concentration problems	3,3 (1,3)	2,9 (1,2)*	3,1 (1,2)*	3,5 (1,3)	3,0 (1,2)*	3,0 (1,1)**
Memory problems	3,0 (1,4)	2,9 (1,3)	2,9 (1,2)	3,0 (1,4)	2,8 (1,2)	2,7 (1,0)
Irritability	2,8 (1,3)	2,6 (1,2)	2,5 (1,2)*	2,8 (1,2)	2,5 (1,0)	2,4 (1,0)*
Sleep problems	2,4 (1,2)	2,5 (1,3)	2,4 (1,3)	2,3 (1,3)	2,3 (1,2)	2,0 (0,9)**

Mean scores by (SD), *=p<0.05, **=p<0.1.

4.3 Overall health and quality of life

General health

Table 4.3 shows the results of the RAND-36. The RAND-36 is a questionnaire that surveys general health. Scores range from 0 to 100, with higher scores indicating better health status. Looking at the different domains of the RAND-36, we generally see stability and, in a few cases, advance or decline. On the Pain subdomain, we see a deterioration on the intermediate measurement (i.e. immediately after the training) that recovers to the starting level on the final measurement. Vitality (zest for life and energy) changes for the better in the total study group, the slight (not significant) increase in the intermediate measurement continues in the final measurement ($t=-2.0$; $p=0.05$). In the participation group, we see the same trend, which is not significant due to the smaller study group; however, the magnitude of the effect is the same. Otherwise, there are no significant differences or trends.

Table 4.3 Results of the RAND-36

Complaints	Entire group			Intervention completed		
	T0	T4	T8	T0	T4	T8
Mental health	56,8 (18,0)	57,1 (20,3)	57,4 (19,3)	58,1 (16,0)	59,0 (16,8)	57,8 (16,5)
Vitality	43,6 (18,1)	47,2 (19,1)	47,8 (21,1)**	45,0 (17,3)	47,4 (19,5)	48,6 (19,3)
Pain	72,1 (28,6)	67,2 (27,8)*	71,0 (28,4)	74,6 (20,6)	69,4 (26,8)**	74,7 (25,5)
General health perception	54,0 (20,9)	52,8 (18,9)	51,3 (22,8)	55,3 (20,6)	55,5 (16,7)	55,6 (19,2)
Health change	61,7 (25,1)	63,1 (26,4)	55,3 (28,6)	61,8 (26,5)	66,2 (27,1)	57,6 (27,9)

Mean scores by (SD), *= $p < 0.05$, **= $p < 0.1$.

Quality of life

To map quality of life, we adopted the questions used in the South Limburg Care Monitor. The scores on the items range from 1 (not at all satisfied) to 7 (very satisfied). Overall, we see that the scores on the intermediate and final measurement are similar. The effects after completion of the training are maintained. The improvements occur mainly among the loyal participants. Among the total group, there is only a favourable change in physical health at the intermediate and final measurement. The loyal participants also score more favourably on social relationships and the total score at the interim and final measurement.

Table 4.4. Quality of life results

Satisfaction	Entire group			Participation group		
	T0	T4	T8	T0	T4	T8
Living situation	5,3 (1,9)	5,6 (1,6)	5,4 (2,0)	5,3 (2,0)	5,8 (1,4)	5,8 (1,6)
Social relations	4,7 (1,6)	4,8 (1,6)	4,9 (1,4)	4,5 (1,5)	5,1 (1,2)*	5,0 (1,3)*
Day care	4,6 (1,6)	4,7 (1,7)	4,9 (1,9)	4,6 (1,5)	4,9 (1,6)	4,9 (1,8)
Financial situation	3,9 (2,0)	4,2 (2,1)	4,2 (2,0)	4,1 (1,9)	4,5 (2,0)	4,5 (1,9)**
Psychological health	3,9 (1,8)	4,0 (1,9)	4,3 (2,0)	4,2 (1,7)	4,2 (1,8)	4,6 (2,0)
Physical health	4,3 (1,8)	4,7 (1,7)**	4,5 (2,1)*	4,3 (1,7)	5,1 (1,5)*	4,8 (1,8)*
Assistance	5,9 (1,2)	6,0 (1,3)	5,9 (1,8)	5,9 (1,0)	6,1 (1,2)	6,2 (1,3)
Life as a whole	4,7 (1,7)	4,7 (1,7)	5,0 (1,6)	4,8 (1,6)	5,1 (1,3)	5,1 (1,4)
Overall score Quality of ^{LifeA}	31,4 (8,2)	32,7 (9,6)	32,8 (9,5)	31,6 (7,6)	34,4 (7,9)*	34,7 (8,0)*

Mean scores by (SD), * = p<0.05, **=p<0.1, ^A = total score of 7 items, assistance not included.

Well-being

To assess well-being, we administered the WHO-5 Well-being Index (WHO-5) (Bech, 2004). The WHO-5 questionnaire consists of five positively worded items according to mental health. Examples of questions include "I felt cheerful and in high spirits", "I felt active and purposeful" and "My daily life was filled with things that interested me". Respondents rated on a 6-point scale from 5=constant to 0=not at all. The higher the score, the better the well-being. We see no significant changes across the different questions of the well-being index and the total score, with one exception: loyal participants more often reported at the end measurement that their lives were filled with interesting things (trend: t=-1.8; p=0.09).

Table 4.5 Well-being

Satisfaction	Entire group			Participation group		
	T0	T4	T8	T0	T4	T8
Merry	2,1 (1,4)	2,1 (1,5)	2,1 (1,4)	2,1 (1,2)	2,2 (1,3)	2,2 (1,4)
Rested and relaxed	2,2 (1,4)	2,3 (1,5)	2,3 (1,5)	2,2 (1,4)	2,4 (1,4)	2,4 (1,4)
Active and purposeful	2,1 (1,4)	2,3 (1,4)	2,1 (1,5)	2,1 (1,4)	2,3 (1,3)	2,2 (1,5)
Fresh and rested	1,8 (1,6)	1,7 (1,6)	1,7 (1,7)	1,8 (1,6)	1,7 (1,5)	1,7 (1,5)
Interesting things	2,4 (1,5)	2,4 (1,6)	2,5 (1,4)	2,3 (1,5)	2,5 (1,4)	2,8 (1,3)**
Total well-being score	42,6 (22,9)	43,1 (24,0)	42,6 (25,5)	42,1 (20,9)	43,5 (21,7)	45,1 (23,5)

Mean scores by (SD), *= p<0.05, **=p<0.1.

4.4 Self-confidence and empowerment

Self-confidence (MHCS)

Confidence in self-efficacy was measured using the Mental Health Confidence Scale (MHCS; Carpinello et al. 2000). This questionnaire consists of 16 questions. It includes questions such as 'How confident are you that . you can set goals for yourself, or '... can stand up for your needs'. Answers can be given on a 6-point scale running from '1=totally no self-confidence' to '6=completely confident'.

We see that the total score of the MHCS is scored lower on the intermediate measurement (trend; p<0.1). This applies only to the total study group. On the final measurement, the score returns to the initial level.

Empowerment according to the Dutch Empowerment List (NEL)

Empowerment as a broader concept was measured using the Netherlands Empowerment List (NEL; Boevink et al. 2009). The NEL has six subdomains of which we used only the subscales belonging, self-management and self-wisdom for this study. Overall, we see no significant differences. There is only a positive trend for the self-management scale at the intermediate measurement for the whole study group.

Table 4.6. Empowerment

	Entire group			Participation group		
	T0	T4 (N=52)	T8	T0	T4	T8
Overall score MHCS	69,2 (10,7)	66,9 (13,1)** N=49	70,5 (13,0)	71,0 (10,3)	69,8 (10,2)	71,1 (12,6)
Total score subdomain belonging	21,2 (4,2)	21,8 (3,5)	21,9 (4,1)	21,3 (3,8)	21,5 (3,6)	22,1 (3,7)
Total score subdomain self- management	17,2 (3,8)	18,0 (3,4)**	17,8 (3,4)	17,7 (3,2)	18,1 (3,0)	17,9 (3,0)
Total score subdomain own wisdom	43,4 (7,0)	42,9 (7,0)	42,8 (7,8)	43,6 (7,2)	43,8 (6,1)	43,4 (6,9)

Mean scores with (SD). * = $p < 0.05$, ** = $p < 0.1$.

4.5 Physical movement

Table 4.7 shows the results of the SQUASH, a questionnaire to assess the level of physical activity. We see that at the intermediate measurement, the total study group significantly decreased exercise in the categories of leisure ($t=2.1$; $p=0.04$) and household activities ($t=2.4$; $p=0.02$). For the group that completed the intervention, this is only true for household activities ($t=2.03$; $p=0.05$).

At the final measurement, we again see that the total study group significantly decreased exercise in the categories of leisure ($t=2.3$; $p=0.02$) and household activities ($t=3.2$; $p=0.00$). We also see that the total number of minutes spent on physical activities decreased significantly ($t=2.0$; $p=0.05$). Among the loyal participants, there were no significant differences in exercise patterns.

Table 4.7 Average number of minutes of physical activity per week

Moving moment	Entire group			Participation group		
	T0	T4	T8	T0	T4	T8
Commuting	26,9 (45,4)	17,9 (34,6)	15,2 (52,0)	18,3 (35,1)	24,9 (39,1)	14,5 (22,4)
Leisure	174,2 (134,0)	132,9 (132,9)*	124,8 (143,4)*	190,7 (137,2)	176,2 (95,7)	200,1 (133,2)
Household activities	160,3 (127,1)	120,0 (117,4)*	102,8 (104,4)*	176,8 (130,0)	140,5 (91,3)*	133,4 (95,4)
Activities at work/school	318,4 (450,6)	299,2 (439,7)	380,0 (740,3)	320,0 (455,1)	377,4 (446,0)	457,9 (826,5)
Total physical activities	642,2 (459,7)	548,5 (556,0)	477,3 (607,5)*	634,9 (432,8)	671,2 (484,2)	625,4 (566,4)

Mean minutes by (SD), *= p<0.05.

Degree of physical activity

Table 4.8 shows 5 stages where the level of physical activity is described. We see a slight shift from no or little exercise to occasional exercise to regular exercise. However, this shift is not significant.

Table 4.8 Phase of physical activity

Phase Physical activity	Entire group			Participation group		
	T0	T4	T8	T0	T4	T8
Not exercising and not starting yet either	6%	2%	2%	3%	0%	9%
Not playing sports but want to start	18%	11%	10%	19%	11%	19%
Occasional sports	36%	46%	45%	35%	39%	17%
Half an hour a day 5 days a week	32%	36%	38%	35%	44%	44%
Exercised intensively 3 times a week	7%	6%	5%	8%	6%	11%

We also asked participants on how many days in the week they exercised more than 30 minutes moderately to intensively. The results are shown in Table 4.9 below.

We see an increase in both the whole group and the group that completed the intervention, however, not significantly.

Table 4.9 Number of days active per week (M (Sd))

	Entire group			Participation group		
	T0	T4	T8	T0	T4	T8
Days active	4,5 (2,2)	4,6 (2,2)	5,3 (2,1)	4,7 (2,4)	4,8 (2,1)	5,2 (2,2)

4.6 Physical parameters

Blood pressure, weight and walk test

Blood pressure was measured three times with an automatic blood pressure monitor. From these, the average was calculated. Both the lower and upper pressures showed no change at the intermediate measurement, i.e. after completion of training.

At the final measurement, lower pressure decreased significantly for both the overall study group ($t=3.1$; $p=0.03$) and participants who completed the intervention ($t=2.6$ $p=0.02$). The upper pressure showed a decreasing trend for both groups.

Incidentally, it is noteworthy that at baseline blood pressure is already quite close to an optimal adult blood pressure (upper pressure 120; lower pressure 80). We did not investigate the extent to which this is related to medication use.

The study protocol included for safety reasons that in case of high blood pressure, doctor or practitioner would be notified. A total of 10 people had hypertension (above 140/90) at the initial measurement. However, it is not the case that precisely these people had lower blood pressure at follow-up measurements. Thus, the lower blood pressure values found in the study do not seem to be the result of notifying practitioners with a possible subsequent medical intervention.

Weight remains stable throughout the three measurements. We do see a significant change on the 6-minute walk test at the intermediate measurement: more metres are covered. This applies to both the total study group ($t=-2.1$; $p=0.04$) and the participation group ($t=-2$; $p=0.02$). However, this effect does not hold at the final measurement.

Table 4.10. Results physical parameters

	Entire group			Participation group		
	T0	T4	T8	T0	T4	T8
Weight in kg	82,8 (17,6)	84,1 (17,8) ⁱⁱⁱ	82,3 (18,3) ⁱⁱ	80,2 (16,8)	82,8 (16,7)	80,1 (17,6)
6-minute walk test (in metres)	532,6 (97,1)	558,8 (102,7)ⁱⁱⁱ*	535,9 (90,8) ⁱ	542,9 (85,5)	575,5 (94,8)* N=31	544,5 (75,7)
Blood pressure - Underpressure	79,5 (9,4)	78,4 (7,6)	73,9 (7,9)ⁱⁱⁱ*	77,9 (8,0)	77,3 (7,1)	74,2 (9,3)*
Blood pressure - Overhead pressure	129,6 (16,2)	129,1 (14,2)	124,2 (17,0)ⁱⁱⁱ**	128,0 (16,4)	127,4 (14,2)	123,5 (17,1)**

Mean scores with (SD), *= $p < 0.05$, **= $p < 0.1$. i= N=39, ii= N=44, iii= N=46.

4.7 Neurocognitive research

Memory

Table 4.11 shows the results of the 15 Words Test, a test to assess verbal learning and short-term memory. On the intermediate measurement, we see positive memory and learning effects that carry over to the final measurement, on which both the whole group and the loyal participants score better. Participants can list more words in the short term and also know how to reproduce them better after a pause.

Table 4.11. Number of words 15 word test

	Entire group			Participation group		
	T0	T4 (N=47)	T8 (N=36)	T0 (N=33)	T4 (N=33)	T8 (N=30)
Test 1	4,7 (2,1)	4,9 (1,8)	5,3 (2,1)	4,9 (2,1)	4,9 (1,9)	5,4 (1,8)
Test 2	6,6 (2,5)	7,2 (2,6)*	7,7 (2,9)**	6,8 (2,7)	7,2 (2,6)	7,7 (3,0)**
Test 3	7,5 (3,2)	8,2 (3,3)*	9,2 (3,0)*	7,7 (3,6)	8,2 (3,4)	9,3 (2,9)*
Test 4	8,5 (3,6)	9,0 (3,8)	9,6 (3,2)	8,7 (3,7)	9,0 (4,0)	9,9 (3,1)**
Test 5	8,9 (3,8)	9,9 (3,7)*	10,2 (3,6)*	9,2 (3,9)	9,9 (3,9)**	10,4 (3,7)*
Recall	7,3 (3,7)	7,9 (4,1)**	8,6 (4,0)*	7,3 (3,9)	7,7 (4,4)	8,7 (4,2)*
Total number of words test 1-5	36,0 (14,4)	38,8 (13,6)*	42,2 (13,1)*	37,2 (15,1)	38,6 (14,3)	42,9 (13,0)*

Mean scores with (SD), *= $p < 0.05$, **= $p < 0.1$.

Continuous Performance Test - Identical Pairs (CPT-IP)

The CPT-IP measures attention and impulsivity. Participants are presented with number combinations and have to respond to a given number combination as quickly as possible. Overall, we see few differences on this test. On one of the five parameters, not responding when the correct number combination is shown, we do see a difference. Reaction time also improves initially (at the intermediate measurement), but not in the longer term.

Table 4.12 CPT results

Variable	Entire group			Participation group		
	T0	T4	T8 (N=45)	T0	T4	T8
Number correct (%)	0,9 (0,1)	0,89 (0,1)	0,89 (0,1)	0,87 (0,2)	0,89 (0,1)	0,89 (0,1)
Average response time (ms)	523,1 (190,3)	465,2 (133,0)*	308,9 (162,8)	508,9 (189,6)	450,7 (101,8)*	497,7 (148,8)
Number missed	1,7 (2,8)	1,2 (2,3)*	1,1 (2,5)*	1,8 (3,2)	1,2 (2,6)*	1,2 (2,8)**
Pressed too many times (false alarm)	3,0 (7,8)	1,6 (3,2)	3,5 (15,3)	2,8 (9,3)	1,5 (0,6)	1,4 (3,0)
'd' (discernment)	3,7 (0,7)	3,9 (0,6)	3,9 (0,6)	3,8 (0,7)	3,9 (0,7)	3,9 (0,7)

Mean scores with (SD), *= $p < 0.05$, **= $p < 0.1$.

Cognitive flexibility

Table 4.13 shows the results of the WCST test, a test that measures the ability to adapt a thinking strategy to changing circumstances.

Among the outcomes of the WCST, we see no significant changes at the intermediate and/or final measurement. We only see a trend at the intermediate measurement when it comes to repeated errors ($t=1.7$; $p=0.09$).

Table 4.13 WCST results

Variable	Entire group			Participation group		
	T0	T4 (N=45)	T8 (N=38)	T0 (N=33)	T4 (N=31)	T8 (N=29)
Completed categories	5,1 (1,8)	4,6 (2,3)	5,0 (1,8)	5,1 (1,9)	4,8 (2,3)	5,3 (1,4)
Total number correct	69,4 (12,2)	63,4 (18,5)	69,7 (14,3)	68,1 (14,1)	63,7 (18,0)	71,8 (10,7)
Repeated errors	9,7 (11,0)	7,6 (11,3)**	9,2 (11,6)	8,7 (10,1)	6,2 (9,5)	8,5 (10,8)
Total errors not sticking to set (Failure to maintain)	0,85 (1,3)	0,67 (1,0)	0,74 (1,2)	0,7 (1,1)	0,6 (0,9)	0,7 (1,2)

Mean scores by (SD), **= $p < 0.1$.

Information processing

Table 4.14 shows the results of the trail making test. This is a test that measures the speed of information processing. The (simpler) test A is faster in both follow-up measurements by both groups. For the (more complex) test B, there is only a speed improvement on the intermediate measurement.

Table 4.14. Speed (seconds) Trail-making test A and B

Trailmaking Test	Entire group			Participation group		
	T0	T4 (N=52)	T8 (N=45)	T0	T4	T8
A (s)	35,8 (24,9)	30,1 (19,3)*	27,6 (11,7)*	32,4 (26,2)	27,5 (16,5)*	27,0 (12,4)*
B (s)	73,6 (53,2)	64,6 (39,4)*	66,1 (36,0)	64,6 (26,4)	57,2 (29,7)*	63,6 (38,4)

Mean time and (SD) in seconds, *p<0.05.

Experienced changes due to the training

Besides the various tests we administered to identify changes, we also asked participants directly about perceived changes. We did this with a pre-structured list after the training. The table below shows participants' perceived changes. Among the total survey group, 63% of people indicate that something has changed. Among participants who completed the training, this is three-quarters. What has changed most for both groups is that they have gained more energy (58% and 72% respectively). Next, more than half of the participants indicate that they can concentrate better. Both these outcomes are consistent with the main goals of the training, improvements in cognition and fitness/vitality. A large group of participants also indicated that their mood had changed (42% and 47% respectively). When asked if they would like to continue with the training, almost all loyal participants (89%) answered positively.

Table 4.15. Perceived change as a result of intervention

Change	Entire group (N=52) Yes (%)	Participation group (N=36) Yes (%)
General	63	75
More sports/movement	33	36
Eat more healthily	37	39
Vote	42	47
Energy	58	72
Social	25	36
Troubleshooting	38	41
Concentration	52	58
Participation sequel	73	89

Below is an explanation of the various items that have been improved.

Sports/movement

One participant indicates that he started walking once a week again, starting with half an hour and now walking for an hour and a half. Another indicates that he now does exercises every day. Yet another has started swimming and walking again. Someone also indicates that he now picks up his bicycle more quickly.

Healthier eating

Some indicate that they have started eating more consciously and others more regularly. They also indicate eating fewer sweets and biscuits and more vegetables, fruit and fish.

Vote

Someone indicates that he feels better because he does things that make him feel good. Another indicates that he can suppress his voices a little better. Someone also indicates being able to get out of a slump faster.

Energy

Participants' comments indicate that they have slightly more energy, particularly physical energy. Although one participant also indicates that mental aspects tire him less.

Social

When commenting, participants indicated the following: looking at people better, being more open to other people and understanding their problems, easier contact, easier conversation, and an expansion of the circle of acquaintances.

Troubleshooting

The following is indicated in the explanation: better perspective, more logical thinking, less chaotic, being able to oversee situations better. Because of the calmness in the head, easier to switch gears. Now more creative, previously more black and white thinking, there is a solution for everything, there are several roads that lead to Rome.

Concentration

Better focus, calmer when reading the newspaper and cleaning up, better ability to think. Keeping attention better during sports.

Continued

The most frequently made comments on the desirability of a follow-up are obvious: participants want to continue because they enjoyed it so much. There is appreciation for the combined focus on body and mind. A follow-up training could help build fitness further.

5 Summary, discussion and recommendations

The Cognitive Fitness training study took place at six institutions from autumn 2014 to mid-2015. In this chapter, we discuss the main conclusions, make a comparison with the experiences in the preliminary study, make comments and make recommendations.

5.1 Summary

Research questions

In this study, in addition to an evaluation of implementation and quality, we wanted to find out what were the benefits of Cognitive Fitness training for people struggling with long-term psychiatric problems, and in particular regarding the core elements of cognitive fitness: cognitive skills and fitness/vitality.

Previous research (Van Wezep et al, 2012) had investigated training with the same target group, delivered by the original developers of the training. If cognitive fitness is to be implemented more widely, it is important that the method is transferable. To this end, new trainers were trained. Based on the original experiences, the training was also slightly modified: more attention was paid to healthy eating, and the number of sessions was increased from 12 to 15, still in a weekly frequency. We investigated implementation and benefits of the training using these new trainers; are they comparable to the original training?

In the present study, not only was a measurement taken immediately after the training ended, but also four months later. Research question was whether effects were maintained at this follow-up.

Recruitment, participation and drop-out

Recruitment was relatively intensive with demonstration workshops for social workers and interested clients. This was done based on the experience that it is important to get a concrete picture of the training and because the joy radiating from such a first training session is contagious and encourages participation.

A total of 74 participants from six institutions participated in the study. Of these, 80% completed a post-training measurement and 69% completed the follow-up measurement. 54% of the participants attended at least half of the trainings. In the pilot study, 78% completed the post-training measurement, and 55% attended at least half of the training sessions. Participation rates of the previous and current study are thus very similar.

Implementation and appreciation

A so-called fidelity instrument was used to examine whether the training courses within the institutions met the formulated principles and manual in design, implementation by trainers, atmosphere, and facilities. This was the case to a high to very high degree at each of the participating institutions. Afterwards, participants rated the training course on average

with a rating of 8.3, the same high rating as in the preliminary survey. A large majority (especially loyal participants) would join a follow-up training if it were offered.

Impact on participants

We asked participants in interviews about the most important returns. These are mostly in the areas where the training tries to intervene: vitality (feeling better in your skin, control over your body, energy) and cognition (attention, concentration). In addition, psychological and social benefits are also mentioned. People are proud of themselves, experience a better mood, the sociability of the group is good, new contacts have been made, and they experience more mutual understanding and acceptance.

Through repeated measures of cognitive skills and health, and with various self-reports, we have mapped the returns in more detail and quantitatively. In some areas the different tests point in the same direction, sometimes there is only favourable change in a subarea or the different tests do not always point in the same direction, and in yet other areas there is no effect. By domain, we see the following picture.

Cognitive skills: Attention and concentration seem to improve. This is shown in several self-reports, but less convincingly in neuropsychological tests. In those tests, we do see a clear improvement in short-term memory; again, this is less clearly confirmed in self-reports. On one test, we also see evidence of improved information processing speed.

General health status, vitality and energy: Improved fitness, increased vitality and energy are evident from various self-reports. Better fitness is also evident from a walking test at the intermediate measurement, but this does not persist at the final measurement. Weight does not change, blood pressure (negative pressure) is lower at the final measurement.

Activities of daily living and exercise: there are no obvious changes in this area. People do not engage in more exercise or sports.

Mental health: on some aspects of mental health we see an improvement. People are less irritable, have fewer sleep problems and experience fewer limitations due to psychological complaints when living. Empowerment and self-confidence do not clearly increase.

Quality of life: here we see a clear difference between the total study group and the loyal participants. The loyal participants report better quality of life in two sub-areas (social and physical) and overall, the total group only in the physical area. The better social quality of life is confirmed in participants' explanations. The sociability of the training did them good, they gained new contacts and sometimes even friendships, and there is more mutual understanding and acceptance.

5.2 Discussion

We discuss the results, starting by considering the limitations of the study.

Restrictions

The most obvious limitation of this study is the lack of a control group. Therefore, we cannot determine whether the effects found are attributable to the training or to natural course.

What we also cannot determine with certainty is whether the results are due to the specific elements of cognitive fitness training or would be found in any group training. We see the clearest and most consistent effects on the core elements of training that address cognitive skills and vitality. This gives some confidence in this respect.

While this study had significantly more participants than the pilot study, it did not have enough to reliably identify even small effects.

Turnout and dropout

A focus of the training is the limited attendance: 54% attended eight or more of the 15 sessions, even though we observed that trainers and/or counsellors made efforts to encourage attendance through appointment reminders, motivation and contacting the participants afterwards in case of absence. Based on experiences in the pilot, an introductory workshop was always held when recruiting participants so that potential participants could get a good idea of the training method. We found no substantial criticisms of the training method in the comments from trainers and participants that could encourage lower attendance. We conclude - and this is also the experience of the trainers - that this limited attendance, especially among itinerant clients who have to take the initiative themselves to come to the training venue, is difficult to avoid.

Effects stick

In the pilot study, only a before-and-after measurement was conducted, now also a follow-up four months after completion of the training. Overall, the results of the measurement immediately after the training are comparable to those of the follow-up measurement. So the benefits seem to stick. In the psychological area and quality of life, the results improve even at follow-up, and blood pressure is also lower then. The improved fitness is not maintained at the follow-up measurement. This would have required participants to have done more physical activities after the training.

Generalisation to everyday life

Research on cognitive training programmes frequently shows that although participants do score better on cognitive tests over time, these returns are far from always having consequences in daily life, which is, of course, what matters. This study is not set up to meticulously map yields in daily life, but a picture emerges from the clients' self-reports that the yields are not limited to the training room. The loyal participants in particular experience a higher quality of life and, in their experience, do more interesting things. The group as a whole experiences less irritability and better concentration recently. We hypothesise

that it was precisely the mixed design of the training (cognition training, relaxation and fitness) - rather than just "drill" cognitive skills - that contributed to the wider returns.

Training is transferable

The main news from this study is that cognitive fitness training appears to be transferable and can be implemented in a variety of places within the mental health system. We have the following indications for this:

- Ratings are as high as ever and attendance figures are similar to those of the pilot study;
- There were relatively small differences in fidelity to the training model among the six institutions; fidelity was scored as high to very high;
- While there are nuance differences compared to the pilot study in the exact effects found, we see similar encouraging results on the whole.

Social impacts

We also see progress on the social front: many have gained social contacts from the training and the loyal participants report a higher quality of life on the social front. The atmosphere in the group is rated very positively. This effect is probably more the generic consequence of the fact that the training was in a group and focused on gaining positive experiences. Nevertheless, it is a very welcome side effect of the training. People with severe mental illnesses suffer greatly from loneliness and often feel that they are not part of society, according to a poll by the Panel Psychisch Gezien (Place et al., 2014).

Few exercise and fitness effects

We were not able to find that participants started exercising or moving more in daily life; weight remained stable and fitness (measured by a walking test) went back to the starting level after an initial improvement. However, loyal participants do report a higher quality of life on a physical level, their blood pressure drops and they experience more vitality. The question is whether the frequency of exercises could be increased to achieve more effect. The pilot study found that there was little focus on homework assignments during the training sessions; they were often not done. In the new design, more attention was therefore given to homework to encourage generalisation to daily life. Nevertheless, even now we see that about half do not get around to doing homework assignments.

It is quite conceivable that a weekly workout of one and a half hours by itself is too little to achieve fitness effects. The choice of intensity and duration of training is balancing between feasibility and achieving optimal effects. In studies within a meta-analysis of physical training in depressed patients, the frequency is higher, typically two to three times a week, for thirty to sixty minutes (Silveira et al., 2013).

A somewhat higher frequency of training or additional exercises could therefore be considered, but it is questionable whether this is feasible. When asked, most participants in the pre-study indicated that they liked the frequency, we see that more pain is reported at the intermediate measurement, and the dropout rate from the training is considerable in both the pre-study and this study. In a clinical context, higher doses are easier to programme,

but in ambulatory patients, the feasibility of increasing the frequency of training sessions is likely to be limited. Nevertheless, this could be experimented with.

Potential for wider implementation

More than 70 trainers across the country have since been trained in delivering the Cognitive Fitness training. Within the six participating institutions, there is an intention to continue the training (or has already been done), although the exact design varies. This study focused on people with severe mental illness, but the training is also being used with a broader target group with (incipient) cognitive and/or vitality problems. Of interest is the option (chosen for follow-up considered within two of the participating sites) to offer the training in the neighbourhood, through recruitment channels of the local welfare organisation or a local news paper, with municipal funding from the WMO.

5.3 Conclusion

We conclude on the basis of this study that cognitive fitness training is well transferable and can be implemented more widely with quality. Participants give very high ratings, even though only a small majority qualify as loyal visitors. Overall, we do not see very large but encouraging effects in the studied target group of people with severe mental health problems, even at follow-up after four months. The combination of cognitive skills and fitness thus seems a valuable addition to the therapeutic offer for this target group.

Recommendations

It would be desirable to confirm the effects in a larger study with a control group receiving no or an alternative group offer. This could also investigate a wider population. After all, the training is not restricted to the target group of people with severe mental illnesses who currently participated in the study.

To achieve more health and fitness effects, a higher frequency of training could be considered. However, it is questionable whether this is feasible with the target group studied (and whether the desired effects then occur). This deserves follow-up research.

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Annex

Main components fidelity Cognitive Fitness

Parts of fidelity:

- Preliminary meeting trainers
- Observation lesson by 2 auditors
- Debriefing trainers

N.B. The lesson/performance is assessed, not the individual trainer(s) except for the trainer questions.

Parts scores fidelity:

1. Competences
2. Didactic
3. Methodical
4. The training
5. Facility/edge conditions
6. Cooperation trainers
7. Rev

- **Component 1: Competences of the trainer**

Competences		
Section	Description	Score
Subject matter and background	Subject matter: <ul style="list-style-type: none"> • Cognitive fitness training completed • Experience in teaching (sports) group classes • Minimum MBO/HBO education • Other experience related to teaching/training. 	See interview questions for trainers Take average of trainers' scores.
Organisational - be able to design a programme/lesson	Draw up a good programme per lesson. Formulate objectives per lesson and evaluate them during and after the lesson by means of a clear lesson preparation form.	The trainer can properly articulate/explain content and purpose to auditors.

• **Component 2: Didactic**

The didactics component is about how the trainer conveys his knowledge, skills and attitude to the participants.

Didactic attitude		
Section	Description	Score
Attitude	The trainer is wearing sporty clothes.	1= no sporting clothes on. 3= do wear sporting clothes.
Presentation to the group	The trainer <ul style="list-style-type: none"> • makes eye contact • has proper distance from the group • has a proper voice volume • is positioned so that participants can see it from the front). 	1= mostly not. 2= sometimes yes/sometimes no. 3= often yes.
Wording	Wording is adapted to the target audience, clear and unambiguous.	1= the wording is too difficult or simple for the target audience. 2= changing during the lesson. 3= Voice and word usage is good, adapted to the target audience.
Style and contact with participants: clarity	The trainer is directing and clear.	1= mostly not. 2= sometimes yes/sometimes no. 3= often yes.
Style and contact with participants: enthusiasm	The trainer is enthusiastic.	1= mostly not. 2= sometimes yes/sometimes no. 3= often yes.
Style and contact with participants: motivational	<ol style="list-style-type: none"> 1) The trainer ensures that the participant gains moments of success, positive achievements. 2) The trainer gives regular compliments to training participants. 3) The trainer names the benefits of the exercises they do, he indicates what the exercise will give him. 4) The trainer uses encouragement techniques such as: "come on, just 10 more seconds, it's going really well". 	1= 1 of the 4 ways of motivating participants is used regularly. 2= 2 or 3 of the 4 ways of motivating participants are used regularly. 3= all 4 ways of motivating participants are used regularly during the lesson.

• Component 3: Methodology

Methods and method by which knowledge is imparted.

Methodology		
Section	Description	Score
Offering the exercise material: talk-your-plate-act	Talk: trainer explains briefly what the exercise involves (the length of the explanation is important here) Picture: trainer shows how the exercise goes/should look (demonstration) Act: participants start working on the exercise.	1= the trainer hardly uses the talk, picture and deed method in his training. 2= The trainer occasionally uses the talk, picture and deed method in his training but he does this regularly when offering exercise material. 3= The trainer regularly uses the talk, picture and deed method in his training.
Does it	Lives it: participants are engaged, focused, enthusiastic, concentrated, having fun, showing experience.	1= hardly at all/nearly none of the participants. 2= variable/somewhat. 3= whole group.
Adjusting exercises	The trainer is able to adapt the exercises to the level of the group and the individual participant. He can do this by making an exercise easier or harder, by building on an exercise and by being creative with an exercise. <u>They are:</u> <ul style="list-style-type: none"> • adjust exercise if necessary • keeping an eye on everyone, individual attention, responding to level • ensuring that everyone is sufficiently challenged. 	1= the trainer barely adapts the exercises to the level of the group. 2= The trainer occasionally adapts the exercises. He uses this by making an exercise easier/difficult, expanding an exercise or being creative with an exercise. But he does not do this consistently, there are many situations where he does not do it. 3= the trainer regularly adjusts the exercises so that at both group and individual level everyone can participate properly.
Feedback - negative/confrontational	Feedback is given according to the rules for giving and receiving feedback, viz: <ol style="list-style-type: none"> a. Describe changeable behaviour. b. Describe concretely and specifically. behaviour you have seen and heard yourself. c. Use an I message. d. Indicate what effect the behaviour produces. e. Let your interlocutor respond. f. Ask for desired behaviour. g. Explore solutions or backgrounds together. 	1= not/nearly. 2= sometimes. 3= often.

• **Component 4: the training; execution and construction of a lesson**

Introduction		
Section	Description	Score
Small-talk	Casual way of making contact, talking about "small talk" without explicit influence.	<p>1= the trainer hardly starts the lesson by talking about topics not related to this lesson.</p> <p>2= The trainer makes casual contact at the beginning of the lesson, but this is relatively very brief or only with a part/some participants.</p> <p>3= The trainer takes enough time to connect with the whole group.</p>
Rational	Trainer can explain content, goals and ratio- nal to the group.	<p>1= the trainer hardly explains anything about the exercise and what it affects.</p> <p>2= The trainer occasionally discusses why the exercise is good for cognitive functions.</p> <p>3= The trainer consistently indicates prior to each exercise what it is good for.</p>
Warm-up	<p>Attention:</p> <ul style="list-style-type: none"> gradual build-up in intensity matching the load capacity <p>For specific description of the warm-up, see the lesson description of the 6th lesson (logical thinking and spatial understanding) in the trainer's manual. This involves dynamic warm-up followed by shadow play and mirror drill.</p>	<p>1= the protocol is hardly followed, the trainer has his own interpretation of the (construction of the) warm-up.</p> <p>2= Some exercises from the protocol and build-up are followed, but the trainer uses many exercises that are not described.</p> <p>3= The trainer follows protocol and structure as described in the trainer's manual.</p>
Core section	<p>Core part is:</p> <ul style="list-style-type: none"> focusing on fitness and strength focusing on cognitive and sensory stimulation. <p>For specific description of the warm-up, see the lesson description of the 6th lesson (logical thinking and spatial understanding) in the trainer's manual.</p>	<p>1= The protocol is hardly followed, the trainer has his own interpretation of the core part.</p> <p>2= Some exercises from the protocol are followed, but the trainer uses many exercises that are not described.</p> <p>3= The trainer follows the protocol as described in the trainer's manual.</p>
Cooling-down	<p>Cooling-down focuses on:</p> <ul style="list-style-type: none"> stretching exercises breathing exercises relaxation exercises <p>For specific description of the warm-up, see the lesson description of the 6th lesson (logical thinking and spatial awareness) in the trainer's manual. This involves stretching exercise and a progressive relaxation, long version.</p>	<p>1= the protocol is hardly followed, the trainer has his own interpretation of the cool-down.</p> <p>2= Some exercises from the protocol are followed, but the trainer uses many exercises that are not described.</p> <p>3= The trainer follows the protocol as described in the trainer's manual.</p>

Pause moments	There are plenty of (short) breaks so participants can also recover (but not too much).	<p>1= No breaks are offered.</p> <p>2= breaks are offered, but this is minimal. It is clear to see in the group that they need this more.</p> <p>3= Sufficient breaks are offered.</p>
Debriefing/evaluation	<p>The debriefing is an informal moment where the social aspect is important and where the trainer looks back at the training with the participants and addresses any questions that arise. The trainer should actively ask participants for their feedback, is he open to this and what will he do with it next? Evaluation can be based on the following questions:</p> <p>How did you experience the training? Was the instruction clear? Was the guidance sufficient? What was achieved, outcome? What went well, what didn't? What could be different for the next training session?</p>	<p>1= there is no follow-up discussion/evaluation.</p> <p>2= There is a debriefing/evaluation, but questions are not addressed and/or no feedback is requested.</p> <p>3= there is a debriefing where there is sufficient space and attention for feedback/questions etc.</p>
Homework	Is checked what was done with the homework? And is this followed up (e.g. if no one has done homework, or if someone indicates that they did not succeed at home).	<p>1= is not checked.</p> <p>2= will be inquired about but otherwise not addressed.</p> <p>3= will be checked and acted upon.</p>
Execution of the exercise	Trainer pays attention to the execution of the exercise in the participants so that the exercise has the effect it is intended for but also to prevent injuries.	<p>1= barely, insufficient.</p> <p>2= attention is paid, but not consistently. 3= good attention is paid during the lesson considering.</p>

• **Component 5: Facility/edge conditions**

Introduction		
Section	Description	Score
Space	Space suffices for the exercises to be done (size etc).	1= no. 2= reasonable. 3= yes.
Accessibility	Room where lessons are taught is easily accessible for participants.	1= no. 2= reasonable. 3= yes.
Timing	<ul style="list-style-type: none"> Duration of the lesson is 90 min. The lesson proceeds as planned. The class is calm, not rushed. 	1= no. 2= reasonable. 3= yes, timing meets all three aspects.
Ratio of participants:trainers	Preferably, there are two trainers for a maximum of 15 participants (ratio 1:7).	1= the ratio is more than 1:10. 2= the ratio is between 1:7 and 1:10. 3= the ratio is <=1:7.
Workbook	Each participant has the workbook.	1= no. 3= yes.

• **Component 6: Collaboration trainers**

Introduction		
Section	Description	Score
Cooperation trainers	The trainers complement each other and the division of roles is clear throughout the lesson.	1= no. 2= reasonable. 3= yes.

• **Component 7: Emergence**

Introduction		
Section	Description	Score
Rev	From this lesson, determine the attendance per-centage. (Number of participants this lesson/ number of participants lesson 1*100).	1= turnout is <60%. 2= turnout is between 60-79%. 3= turnout is >=80%.
Motivation attendance	Trainer is committed to keeping dropout rates as low as possible. Employs various techniques to do so. Motivates participants to come. Calls participants after. Etc.	1= no. 2= somewhat. 3= yes.

